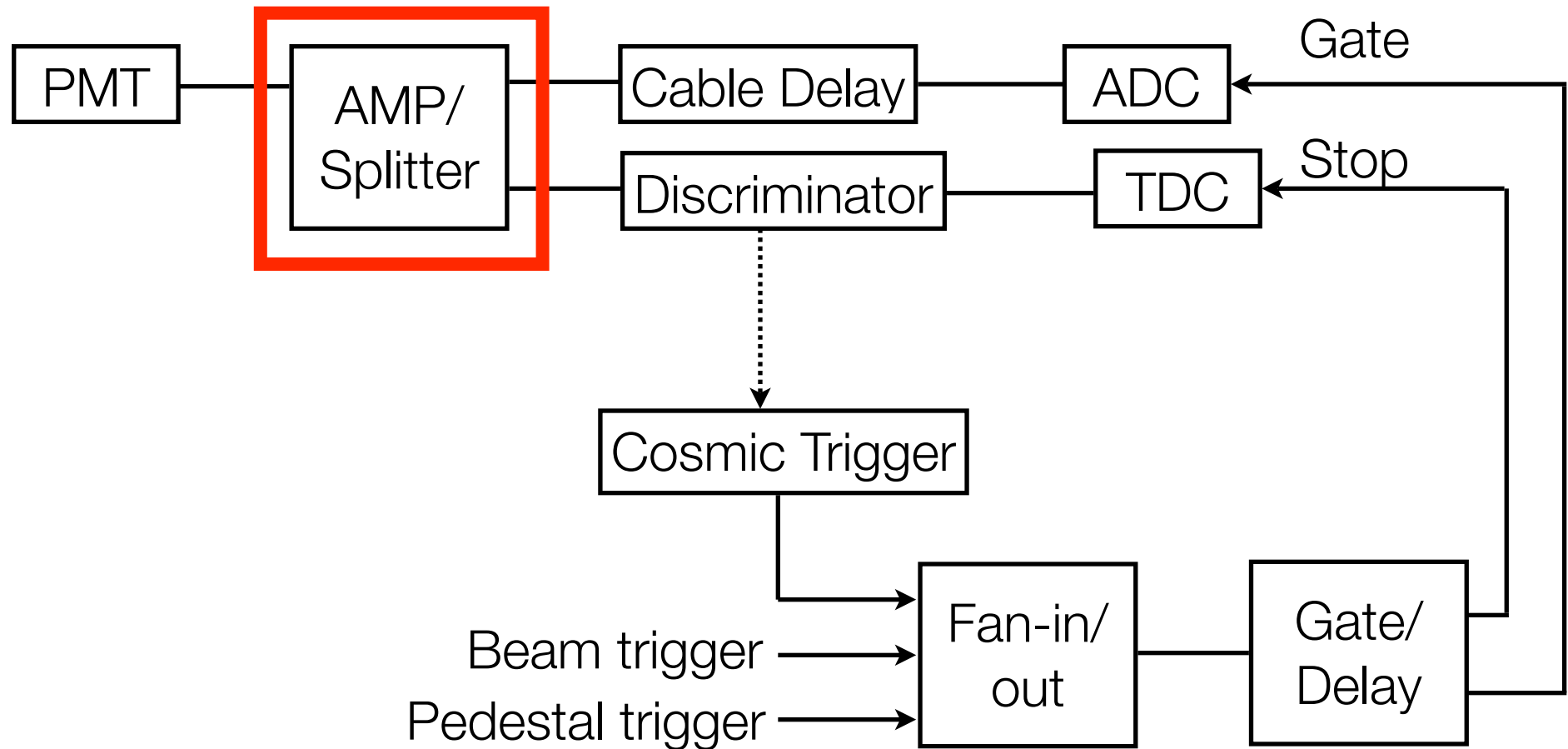# Current status of MRD DAQ

Yasuhiro Nakajima
14 September 2006
SciBooNE Collaboration Meeting
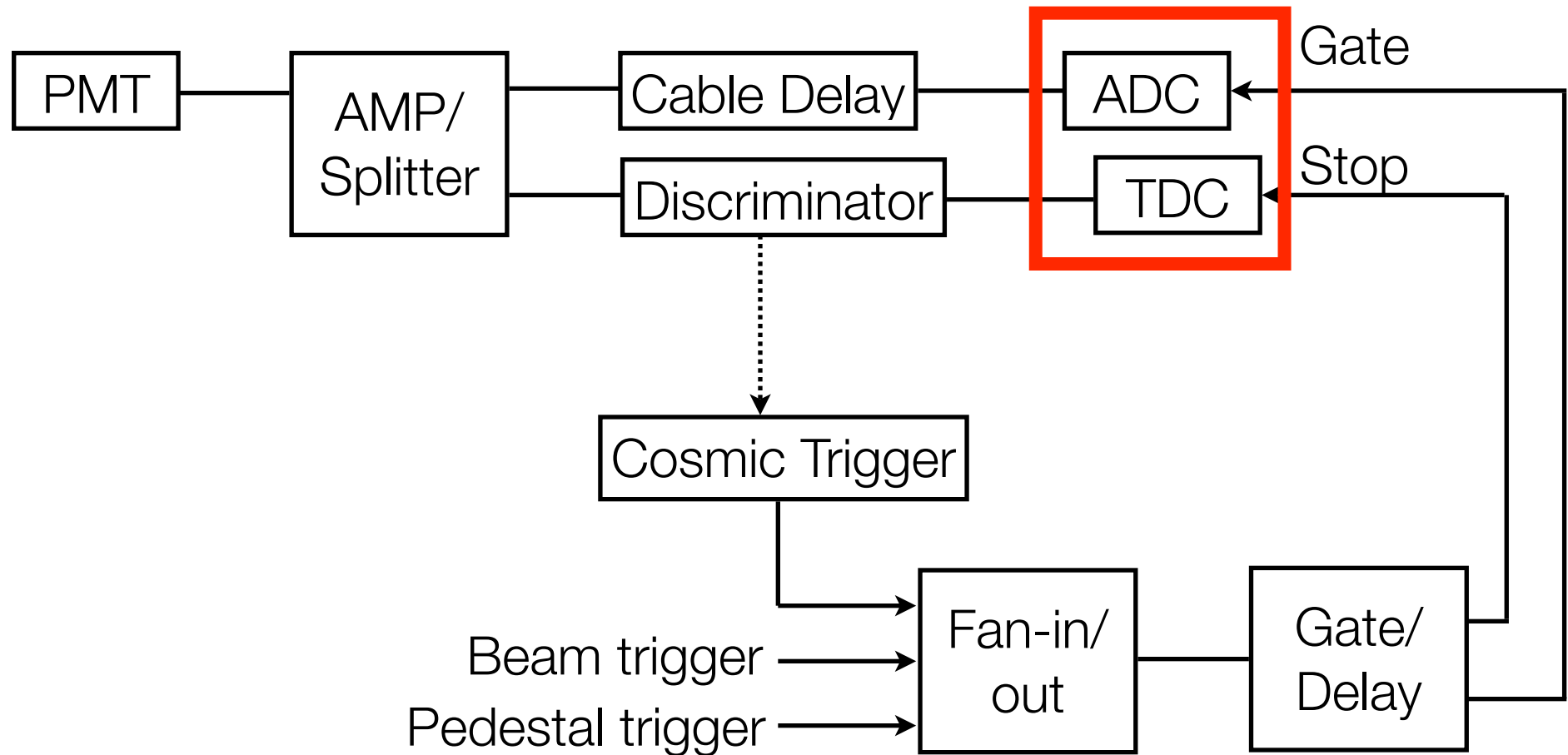
DAQ design overview

AMP/Splitter

- AMP: LeCroy 612 PMT Amplifier

  - For 10 stage PMT

  - x10 Amp.

  - 2 output / channel, 12 channel / module (NIM module)

  - Total ~100 ch → 1 NIM crate

  - Amplification time: ~20 ns → compensated by cable length

- Splitter: Passive splitter

  - For 14 stage PMT

  - Total ~250 ch

  - We have to create that

DAQ design overview

ADC

- LeCroy 4300B ADC

- 11 bit, 0.25 pC/channel

- Designed for gate width < 500 ns, while we need 2 μsec.

  - Pedestal values of some channels goes to negative w/ 2 μsec gate → Fixed!!!

- Succeed to operate 1 module with positive pedestal value.

- PREP has enough number of modules for us.

- There seems no problem so far. Use 4300B for MRD.

Manual at PREP website

```
Residual Pedestal:  Minimum 1 pC and maximum 13 pC for a gate width
    from 50 to 500 nsec and all inputs open.
    Adjustable with an internal potentiometer for gate width
    > 500 nsec. Subtracted from data by CAMAC command.
```
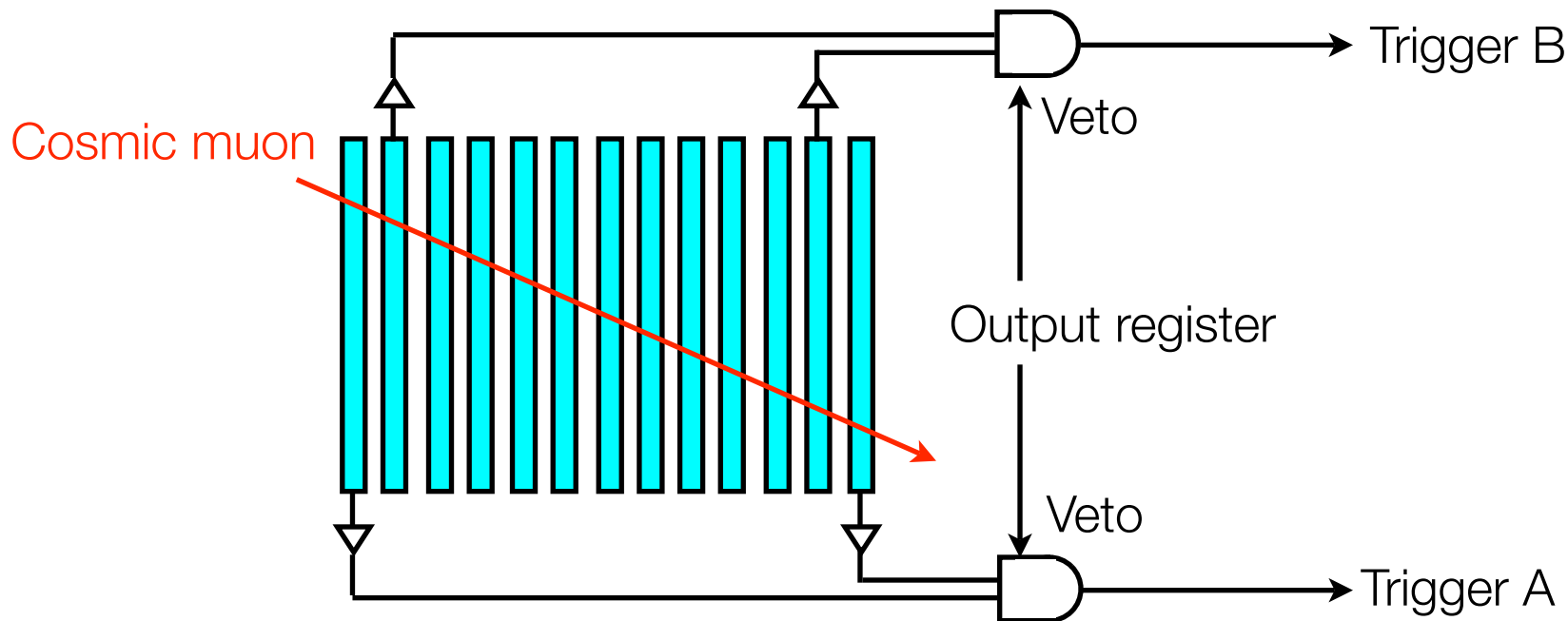
TDC

- LeCroy 3377 TDC

- Multi hit TDC

- Data size

    - Single word mode: 10 bit

    - Double word mode: 16 bit

- Timing resolution: 0.5-4.0 ns (we can choose)

- Current plan:

    - single word (10 bit), 2.0 ns resolution, 2 μsec full scale.

    - common stop

- We have 16 modules on hand (we need 13 modules.)

- 1 module is tested and successfully operated.
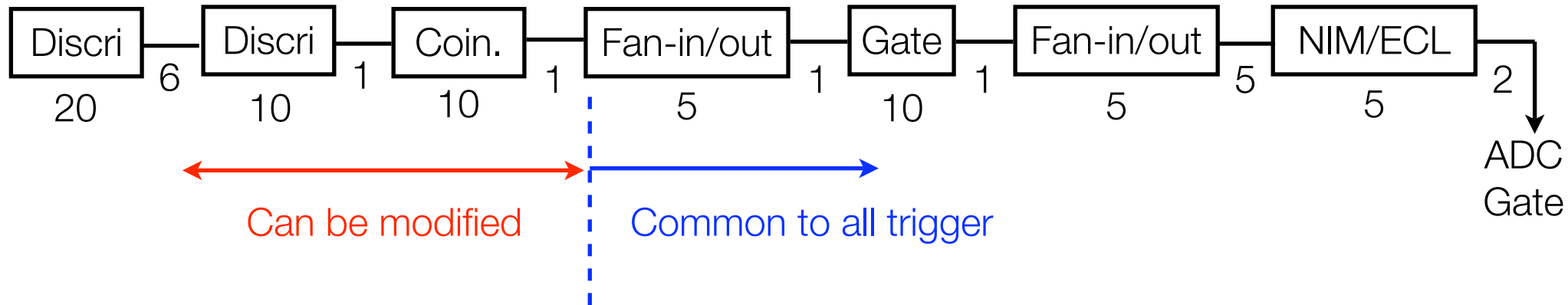
DAQ design overview
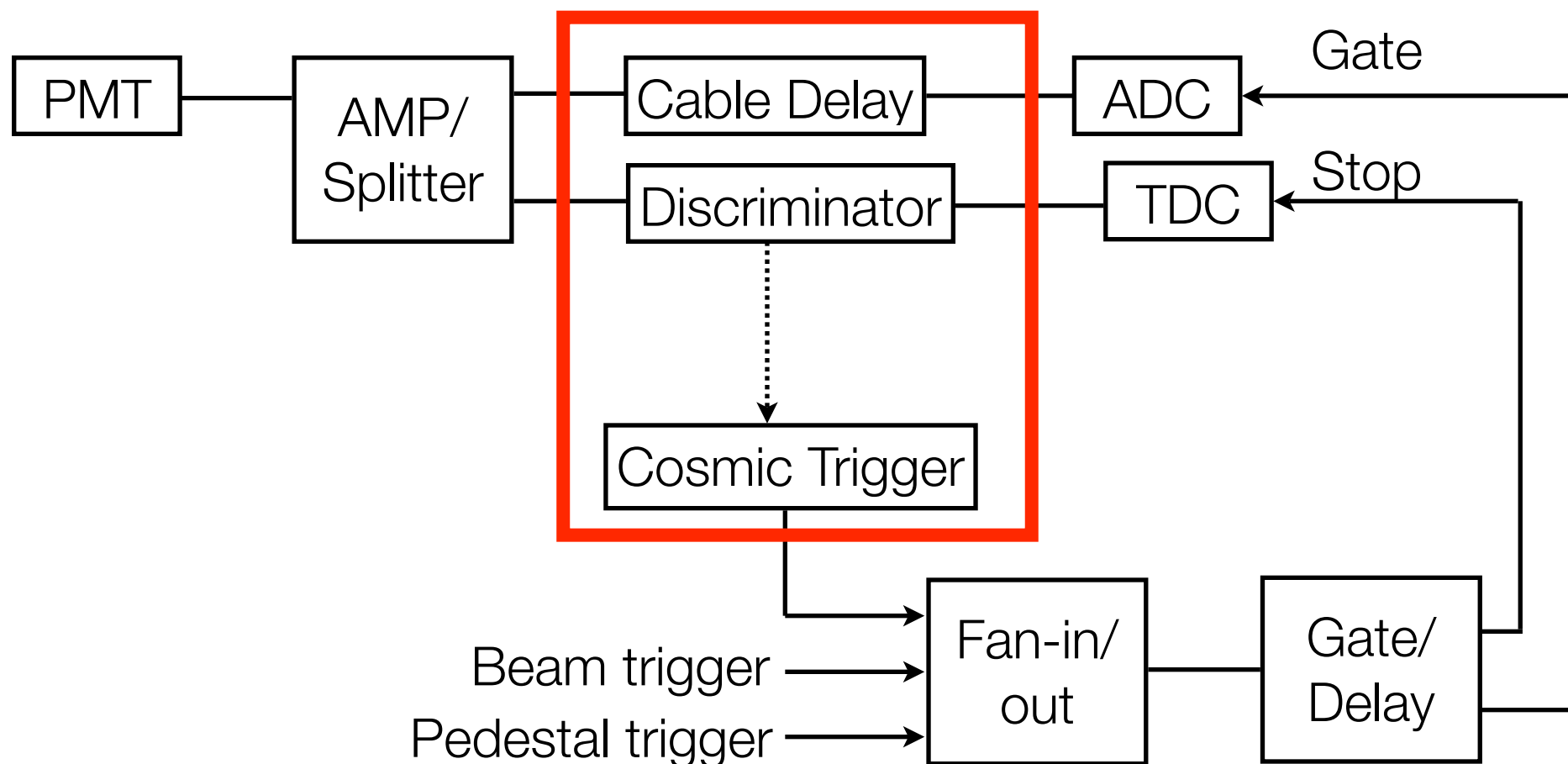
Cosmic trigger

- 2 independent trigger : trigger A, trigger B

  - trigger A(B) will be used for evaluate performance of the counters participating trigger B(A).

  - Will be switched for each cycle.

- Design not fixed

- Current design:

Trigger decision time, delay cable length

Discri		Discri		Coin.		Fan-in/out		Gate		Fan-in/out		NIM/ECL	
20	6	10	1	10	1	5	1	10	1	5	5	5	2

← Can be modified | Common to all trigger →

ADC Gate

- 82 ns from first discriminator to ADC gate input

- + 20 ns: ADC gate should precede the analog signal

- + 10~20 ns: fluctuation of signal timing due to light propagation in scintillator and muon time of flight.

- Total ~122 ns

- We need 25~30m (125~150ns) delay cable for each channel.

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Summary and To do

- We have almost all modules we need.

- Splitter

  - Use AMP for 10-stage tube and passive splitter for 14-stage tube.

  - To do: create splitter for ~250 channel

- ADC/TDC

  - ADC: LeCroy 4300B, TDC: LeCroy 3377 (CAMAC modules)

  - Succeeded to operate 1 module

  - To do: check all modules and test DAQ speed with full setup

- Cosmic trigger

  - Basically coincidence of first and last layer: needs ~120 nsec.

  - To do: Create/Correct 25~30m delay cable for every channel.